WHAT IS CLAIMED IS

1. A Maximum likelihood sequence estimator (MLSE) for estimating a sequence of transmitted symbols received over a dispersive communication channel, wherein a trellis of states and trellis paths are associated with the possible transmitted symbol sequence, said MLSE comprising:

a plurality of data sources relating respectively to state transition probabilities and observed values of received data symbols;

means for calculating and storing the likelihood metric and survivor bit for each state of the trellis using values from said data sources;

means for determination of the final state on the maximum likelihood path in the trellis; and

means for calculating the maximum likelihood sequence of transmitted symbols in a backward trace through the trellis using said stored survivor bits.

2. The system of claim 1 further comprising:

a method for computing supporting branch metric parameter calculations wherein branch metric parameters are computed recursively for a Gray coded sequence of states, wherein said recursive computation requires only a single addition operation per branch metric parameter per state, thereby substantially reducing the number of computational steps required per branch metric parameter calculation.

3. The MLSE of Claim 2 wherein said branch metric parameters are pre-computed and stored in data memory prior to forward trace through the trellis, said stored branch metric parameters retrieved from memory as needed to support state metric calculations subsequently performed in forward trace through the trellis.

4. The MLSE of Claim 2 wherein said branch metric parameters are computed in real time as needed for state metric calculations, and wherein the sequencing of the states is according to a Gray code for both branch metric calculations and state metric calculations, thereby achieving a substantial savings in data storage requirement.

5. The MLSE of Claim 1 further including means to utilize prior knowledge about the initial trellis state to enhance MLSE estimation performance of said transmitted sequence, said performance enhancing means including:

initial state register paired with initial state mask register wherein said pair of registers define a set of valid initial states representing prior knowledge about the transmitted sequence; and

means for initialization of trellis state metrics such that the MLSE Viterbi algorithm selection of the maximum likelihood path in the trellis is confined only paths having a valid initial state.

6. The MLSE of Claim 1 further including means to utilize prior knowledge about the initial trellis to enhance MLSE estimation performance of said transmitted sequence, said performance enhancing means including:

final state register paired with final state mask register wherein said register pair define a set of valid final states representing prior knowledge about the transmitted sequence; and

means for selection of the final state of the trellis on the maximum likelihood path such that the MLSE Viterbi algorithm selection of the maximum likelihood path in the trellis is confined only to paths having a valid initial state.

7. The MLSE of Claim 2 further including means to provide sufficient data for the class of soft decision generators that are dependent only on partial path metrics.

8. A method of computing a maximum likelihood sequence estimate comprising:

providing an initial state;

providing an initial state mask comprising a plurality of bits having either a first polarity or a second plurality; and

determining a plurality of valid initial states by:

starting with the initial state; and

substituting a don't care for each bit in the initial state which has a corresponding bit having a first polarity in the initial state mask,

wherein the valid initial states are defined by either a one or a zero in the bit position having a don't care, and the same bit as the initial state in the other positions.

9. The method of claim 8 wherein the initial state mask is determined by a power up characteristic of a transmitter.

10. The method of claim 9 wherein the transmitter is compliant with the Global System for Mobile standard.

11. A method of computing a maximum likelihood sequence estimate comprising:

providing a trellis comprising a plurality of nodes corresponding to a plurality of states at a plurality of stages;

providing a present state comprising a series of bits; and

incrementing the present state to a next state by changing only one bit.

12. The method of claim 11 wherein the incrementing the present state to a next state by changing only one bit is done in a Gray code.